

## WHAT IS CLAIMED IS:

1. A backup and recovery method for a storage system that avoids journal overflow comprising:
  - producing at least a first snapshot of a data volume which is configured
  - 5 to receive data by way of write operations issued from a host device;
  - producing a journal entry for each write operation issued from the host device;
  - storing each journal entry in a journal volume, thereby accumulating a list of journal entries;
  - 10 monitoring an amount of free space on the journal volume; and
  - when the free space falls below a threshold value, taking a new snapshot of the data volume and deleting the oldest journal entry, thereby avoiding journal overflow.
- 15 2. A backup and recovery method according to claim 1, wherein said threshold value is set in a management table which includes a plurality of entries each containing information of respective journal volumes.
- 20 3. A backup and recovery method according to claim 2, wherein one of said entries of said management table includes an indication of the size of a journal pool which includes said journal volume.
- 25 4. A backup and recovery method according to claim 3, wherein said threshold value is an indication of the lowest amount of free capacity of the journal pool the storage system is allowed to reach.

5. A backup and recovery method according to claim 3, wherein said threshold value is an indication of the lowest percentage measure of the amount of free capacity to the total amount of capacity of the journal pool the storage system is allowed to reach.

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6. A backup and recovery method for a storage system that avoids journal overflow comprising:

producing a snapshot of a data volume which is configured to receive data by way of write operations issued from a host device;

10 producing a journal entry for each write operation issued from the host device;

storing each journal entry in a journal volume, thereby accumulating a list of journal entries;

monitoring an amount of free space on the journal volume; and

15 when the free space falls below a threshold value, taking a logical snapshot of the data volume and deleting the oldest journal entry, thereby avoiding journal overflow.

7. A backup and recovery method according to claim 6, wherein said  
20 threshold value is set in a management table which includes a plurality of entries each containing information of respective journal volumes.

8. A backup and recovery method according to claim 7, wherein one  
of said entries of said management table includes an indication of the size of a  
25 journal pool which includes said journal volume.

9. A backup and recovery method according to claim 8, wherein said threshold value is an indication of the lowest amount of free capacity of the journal pool the storage system is allowed to reach.

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10. A backup and recovery method according to claim 8, wherein said threshold value is an indication of the lowest percentage measure of the amount of free capacity to the total amount of capacity of the journal pool the storage system is allowed to reach.

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11. A backup and recovery method according to claim 6, wherein said logical snapshot includes changes to the data stored on the data volume as represented by a bitmap,

wherein each bit of the bitmap indicates whether a change has been made to a corresponding area of the data volume.

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12. A backup and recovery method for a storage system that avoids journal overflow comprising:

producing at least a snapshot of a data volume which is configured to receive data by way of write operations issued from a host device;

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producing a journal entry for each write operation issued from the host device;

storing each journal entry in a journal volume, thereby accumulating a list of journal entries;

monitoring an amount of free space on the journal volume; and

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when the free space falls below a threshold value, stopping the storing of journal entries, switching to bitmap management and taking a logical snapshot of the data volume, thereby avoiding journal overflow.

5           13.    A backup and recovery method according to claim 12, wherein when the storing of journal entries have been stopped and control is switched to bitmap management, said method further comprising:  
              adding capacity to said journal volume.

10           14.    A backup and recovery method according to claim 12, wherein said logical snapshot includes changes to the data stored on the data volume as represented by a bitmap,  
              wherein each bit of the bitmap indicates whether a change has been made to a corresponding area of the data volume.

15           15.    A backup and recovery method according to claim 12, wherein said threshold value is set in a management table which includes a plurality of entries each containing information of respective journal volumes.

20           16.    A backup and recovery method according to claim 15, wherein one of said entries of said management table includes an indication of the size of a journal pool which includes said journal volume.

              17.    A backup and recovery method according to claim 16, wherein  
25   said threshold value is an indication of the lowest amount of free capacity of the

journal pool the storage system is allowed to reach.

18. A backup and recovery method according to claim 17, wherein  
said threshold value is an indication of the lowest percentage measure of the  
5 amount of free capacity to the total amount of capacity of the journal pool the  
storage system is allowed to reach.

19. A backup and recovery method for a storage system that avoids  
journal overflow comprising:  
10 storing write data in a data volume which is configured to receive data by  
way of write operations issued from a host device;  
producing a journal entry for each write operation issued from the host  
device;  
storing each journal entry in a journal volume, thereby accumulating a  
15 list of journal entries;  
monitoring an amount of free space on the journal volume; and  
when the free space falls below a threshold value, overwriting the oldest  
journal entry stored on the journal volume, thereby avoiding journal overflow.

20. A backup and recovery method according to claim 19, wherein  
said threshold value is set in a management table which includes a plurality of  
entries each containing information of respective journal volumes.

21. A backup and recovery method according to claim 20, wherein  
25 one of said entries of said management table includes an indication of the size

of a journal pool which includes said journal volume.

22. A backup and recovery method according to claim 21, wherein  
said threshold value is an indication of the lowest amount of free capacity of the  
5 journal pool the storage system is allowed to reach.

23. A backup and recovery method according to claim 21, wherein  
said threshold value is an indication of the lowest percentage measure of the  
amount of free capacity to the total amount of capacity of the journal pool the  
10 storage system is allowed to reach.